

Fire Alarm Signaling Systems

Third Edition

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Preface

For more than 100 years the National Fire Protection Association has been working to protect people and property from fire, and part of that effort has been to serve the needs of fire alarm system designers, manufacturers, installers, and users through the publication of its codes, standards, and recommended practices, many of which apply to fire alarms.

The continued rapid evolution of fire alarm systems in the last two decades has completely overshadowed the developments of the previous 100 years. We have progressed from the early fire alarm telegraph systems to signal multiplexing; from the hand ringing of a bell to automatic voice communication systems; from hardwired connections to fiber optics and wireless transmission; from unsupervised smoke detectors to addressable and analog devices that report their status; from relay-based architecture fire alarm control units that were dubbed “solid-state” because of their immense weight and size to today’s microprocessor-based fire alarm control units; and from fire detectors that required enormous fires to actuate to smoke detectors that respond to only a few ounces of combustibles.

All of these changes have contributed to the fire alarm systems available today, whether they are single station residential smoke alarms or high-rise computer-controlled combination fire alarm and building management systems.

At the same time, this technical development has contributed to and been influenced by the fire alarm codes and standards used to detail the performance standards, test requirements, and installation of these systems.

Together, the National Fire Protection Association and the Society of Fire Protection Engineers have presented this handbook on *Fire Alarm Signaling Systems* to respond to the need for a guide to acquaint readers with the different types of fire detection and alarm systems, their application and operation and the requirements for each, as set forth in *NFPA 72®*, *National Fire Alarm Code®*, as well as Underwriters Laboratories and FM Global Standards.

Fire Alarm Signaling Systems is designed to help the user intelligently apply the fire alarm system technology to comply with owner-based fire protection goals and the applicable codes and standards. The book serves as a how-to-guide that acquaints the reader with the basic requirements for use of each of the fire alarm systems and differentiates between each system. It takes up where the *National Electrical Code® Handbook* leaves off by expanding upon the sections of that handbook that discuss wiring of alarm systems.

Fire Alarm Signaling Systems is *not* intended to substitute for the fire alarm system codes and standards, or to be a summarization of them. Rather, it approaches fire detection and alarm systems from a different perspective: its purpose is to provide information on the basic requirements of fire detection and alarm systems *and* explanations of how fire alarm systems fit and work within those standards. A glossary of terms is provided at the end, and illustrations have been included to expand upon the material presented in the text and to assist the user visualizing actual alarm systems.

This third edition of *Fire Alarm Signaling Systems* contains many significant changes:

- Revisions and updates to reflect the significant changes made to *NFPA 72* over the past nine years
- A new chapter on the history of fire alarm systems
- Updated information to current requirements of the *National Fire Alarm Code*
- Quality control during the installation process
- Prescriptive versus performance design applications
- Intelligibility of voice evacuation fire alarm systems
- Fire alarm systems installation guidelines
- Basic fire alarm system plans review
- Reorganization for better flow and understanding
- Questions to enhance understanding at the end of each chapter
- New sections, which include
 - choosing a fire alarm system
 - establishing fire protection goals
 - matching the fire alarm system to fire protection goals
 - understanding fire alarm system limitations

Other additions to the book include data on fiber optic technology and analog and addressable devices used in fire detection systems.

Until now, there has been no single, consolidated source for the general information provided in this book, though its necessity is evident. The professionals who contributed to this book brought more than 100 years of cumulative experience to the task; their contributions outline the latest advances in fire alarm signaling systems.

The future of fire detection and alarm systems is promising and will continue to grow out of today's basic knowledge. It is hoped that this handbook will assist those in the field to better understand the application concepts and operation of fire alarm systems. The goal of this work is to be the stimulus to

take fire alarm systems to their next level of performance to meet our ever-constant need to alert people, in time, for safe evacuation and prompt fire-fighting activities.

The editors would appreciate receiving any comments and suggestions that will improve the contents, as future editions of the book will be revised and expanded to keep the information current.

Acknowledgments

The first edition of *Fire Alarm Signaling Systems* was named *Fire Alarm Signaling Systems Handbook*. It was prepared in 1987 as a joint effort of the National Fire Protection Association and the Society of Fire Protection Engineers. *Fire Alarm Signaling Systems Handbook* was created by a team of talented professionals lead by Charles Zimmerman, who for many years was NFPA's Fire Alarm Signaling Systems Specialist. Charlie was as much a major contributor to the first edition as he was its editor. This edition is dedicated to Charlie for his constant promotion of "doing it right" and his commitment to the fire alarm industry. Additionally, the following technical experts contributed an inestimable amount of their time and expertise to the first edition: Jack Abbott, Joe Drouin, Peter Dubivsky, Al Heim, Vic Humm, Ted Humpel, Stan Kravontka, Bob McPherson, Wayne Moore, Crawley Parris, Mickey Reiss, Jim Roberts, Bill Rogers, Joseph Scheffey, Walter Schuchard, and Max Schulman. Much of what they wrote for *Fire Alarm Signaling Systems Handbook* has been updated and reused in the third edition, and the authors and editors of this edition of *Fire Alarm Signaling Systems* wish to acknowledge their contributions, as well as the contribution of Robert O'Laughlin, who co-authored the first two editions.

The third edition was exclusively prepared by Richard W. Bukowski and Wayne D. Moore.

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